National Transportation Safety Board
Washington, DC 20594

Brief of Accident

Adopted 03/31/1998

DCA96MA068
File No. 1696 | 07/06/1996 | PENSACOLA, FL | Aircraft Reg No. N927DA | Time (Local): 14:24 CDT

Make/Model:	McDonnell Douglas / MD-88
Engine Make/Model:	P&W / JT8D-219
Aircraft Damage:	Substantial
Number of Engines:	2
Operating Certificate(s):	Flag Carrier/Domestic
Name of Carrier:	DELTA AIR LINES INC
Type of Flight Operation:	Scheduled; Domestic; Passenger Only
Reg. Flight Conducted Under:	Part 121: Air Carrier

	Fatal	Serious	Minor/None
Crew	0	0	5
Pass	2	2	133

Last Depart. Point:	Same as Accident/Incident Location
Destination:	ATLANTA , GA
Airport Proximity:	On Airport
Airport Name:	PENSACOLA REGIONAL
Runway Identification:	17
Runway Length/Width (Ft):	7002 / 150
Runway Surface:	Asphalt
Runway Surface Condition:	Dry

Condition of Light:	Day
Weather Info Src:	Weather Observation Facility
Basic Weather:	Visual Conditions
Lowest Ceiling:	Unknown
Visibility:	7.00 SM
Wind Dir/Speed:	210 / 012 Kts
Temperature (°C):	32
Precip/Obscuration:	

Pilot-in-Command Age: 40

Certificate(s)/Rating(s)
Airline Transport; Multi-engine Land
Instrument Ratings
Airplane

Flight Time (Hours)

Total All Aircraft:	12000
Last 90 Days:	142
Total Make/Model:	2300
Total Instrument Time:	UnK/Nr

During the initial part of its takeoff roll, the airplane experienced an engine failure. Uncontained engine debris from the front compressor front hub (fan hub) of the #1 (left) engine penetrated the left aft fuselage. Two passengers were killed and two others were seriously injured. The takeoff was rejected, and the airplane was stopped on the runway. The fan hub had fractured through a tierod hole and blade slot. Some form of drill breakage or drill breakdown, combined with localized loss of coolant and chip packing, had occurred during the drilling process, creating an altered microstructure and ladder cracking in the fan hub. Drilling damage extended much deeper into hole sidewall material than previously anticipated by P & W. Fatigue cracks initiated from the ladder cracking in the tierod hole and began propagating almost immediately after the hub was put into service in 1990. The crack was large enough to have been detectable during the last fluorescent penetrant inspection at Delta. Delta's nondetection of the crack was caused either by a failure of the cleaning and fluorescent penetrant inspection processing, a failure of the inspector to detect the crack, or some combination of these factors.

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Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: TAKEOFF - ROLL/RUN

Findings
1. 1 ENGINE
2. (C) COMPRESSOR ASSEMBLY,ROTOR DISC - FATIGUE
3. (C) MAINTENANCE,INSPECTION - INADEQUATE - COMPANY MAINTENANCE PERSONNEL
4. (C) COMPRESSOR ASSEMBLY,ROTOR DISC - FRACTURED
5. COMPRESSOR ASSEMBLY,ROTOR DISC - SEPARATION

Occurrence #2: MISCELLANEOUS/OTHER
Phase of Operation: TAKEOFF - ROLL/RUN

Findings
6. MISC,ENGINE UNCONTAINED FAILURE
7. FUSELAGE,CABIN - FOREIGN OBJECT DAMAGE

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this accident as follows.
the fracture of the left engine's front compressor fan hub, which resulted from the failure of Delta Air Lines' fluorescent penetrant inspection process to detect a detectable fatigue crack initiating from an area of altered microstructure that was created during the drilling process by Volvo for Pratt & Whitney and that went undetected at the time of manufacture. Contributing to the accident was the lack of sufficient redundancy in the in-service inspection program. (NTSB Report AAR-98/01)